

EFFECT OF PHYSICAL CHARACTERS OF PODS AND SEEDS OF *PARKIA TIMORIANA* (DC.) MERR ON PROTIEN CONTENTS OF SEEDS

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ABSTRACT

Ten samples of mature entire pods of *Parkia timoriana* were analyzed for certain physico - chemical characters. In the study, parameters for each of the physical characters such as length and breadth of pod and seed, number of seeds per pod, seed thickness and dry matter weight per seed were noted to vary significantly ($p < 0.05$) in majority of the cases. In majority, dry matters of decorticated seeds of such samples possessed variable levels for either of crude proteins or true proteins, the values being 16.11 - 28.25% and 14.77 - 27.25% respectively. It was observed that none of the samples excelled the others in all characters and moreover, no case of inter sample similarity of characters was recorded.

INTRODUCTION

It can be assumed that the branding of legumes as rich sources of proteins is amidst the inter species as well as inter variety variation of protein content (Gayatri, 1991; Saxena *et al.*, 1994 and Chikwendu, 2007). Hence sorting out of high protein variety of a legume species is one of the areas of interest.

In furtherance it is to state that *Parkia timoriana* hitherto denoted by different scientific names such as *P. roxburghii*, *P. javanica* and *P. biglobosa* etc. (Helen, 1994) is a tree bean distributing in India in north eastern region where people of Manipur consume its food products very favouritely and substantially. The bunches of sword like entire pods right from the young to mature stages were brought from important growing regions of Tamenglong district and Manipur valley for selling in Imphal markets. However regarding this legume Meitei and Singh (1990) merely mentioned the availability of *P. timoriana* in Manipur into nine varieties based on organoleptic property. Moreover previous works on the nutritional values of pod and seeds of *P. timoriana* growing in Manipur (Giri and Singh, 1997; Longvah and Deosthale, 1998; Giri 2000; Jekendra *et al.*, 2009 and Priya and Giri, 2012) had no relevance with the variety or genotype. But interestingly physical characters of mature pods and their seeds of *P. timoriana* can be seemingly taken as distinguishing criteria of samples for envisaging the intra species variation of nutrient composition, if any. In the present study such pursuit of comparing nutrient composition is undergoing with protein.

MATERIALS AND METHODS

Bunches of eight or more mature entire pods *P. timoriana* seemed to have different inter samples physical characters, but of intra sample uniformity of the characters were procured from Imphal markets. Each sample was constituted by three bunches. These samples were assorted with serial numbers and then sun dried. The breadths and lengths of pods were measured using standard measurement scale and seeds per pod were enumerated.

Then the entire pods were splitted manually to separate mature seeds from pods and seeds belonged to a sample were mixed. Their length, breadth and thickness were measured. For determination of moisture content and dry matter weight per seed, mature seeds of known weight and number were dried by keeping inside oven for 24h maintaining temperature at 60°C (Ranganna, 1986). The remaining seeds of each sample were decorticated manually and ground upto 60 mesh sizes. These samples were further dried up by storing inside desiccators having indicating type silica gel as dessicant. After attaining constant weight, the samples were subjected to the determinations of crude protein by microkjeldahl method and non protein nitrogen (Sadasivam and Manickam, 1996). For calculation of true protein content non protein nitrogen content was deducted from total nitrogen content and it was then multiplied by 6.25 (Sadasivam and Manickam, 1996).

For each physical character, nine readings were taken for a sample, whereas regarding determination of each chemical

Table 1: Physical characters of mature pods and their seeds and moisture, crude proteins and true proteins contents of mature seeds

Sample no.	1	2	3	4	5	6	7	8	9	10
Pod length, cm	29.06 ^a	33.50	29.40 ^a	28.90 ^a	31.92	39.76	27.78	24.06	26.34	27.14
Pod breadth, cm	3.28 ^a	3.42 ^b	4.02	3.58 ^c	3.88	3.50 ^c	3.00 ^d	2.94 ^d	3.42 ^b	3.20 ^a
No. of seeds / pod	18	13 ^a	17	16 ^b	14 ^c	16 ^b	14 ^c	15	13 ^a	13 ^a
Seed length, mm	16.33 ^a	16.66 ^a	18.96	14.20	17.56 ^b	17.36 ^b	15.80 ^c	15.20 ^c	16.50 ^a	17.00
Seed breadth, mm	12.66 ^b	15.06	10.43 ^a	10.00 ^a	12.66 ^b	13.20	11.46	10.20 ^a	11.60 ^c	10.66 ^a
Seed thickness, mm	8.63	5.83	7.16 ^a	7.33 ^a	5.76 ^b	5.73 ^b	7.50 ^a	7.10 ^a	6.93 ^a	5.56 ^b
Dmw / mature seed, g	0.72 ^a	0.72 ^a	0.63 ^a	0.47	0.64 ^b	0.67	0.74 ^a	0.56	0.67 ^b	0.50
* Moisture content %	4.98 ^a	5.95	5.39	6.35 ^b	4.97 ^a	5.06 ^a	4.58	5.03 ^a	4.77	6.20 ^a
** Crude proteins %	23.57	24.07 ^a	28.25	19.25	25.08	24.30 ^a	16.11	24.67	26.59	26.91
** True proteins %	22.33	23.33 ^a	27.25	18.11	23.64 ^a	22.92	14.77	23.30 ^a	25.99 ^b	25.78 ^b
** Non protein nitrogen%	0.20 ^a	0.12	0.16	0.18 ^a	0.23 ^a	0.22 ^a	0.21 ^a	0.22 ^a	0.10	0.18

Dmw: Dry matter weight, *: Whole mature seed, **: Dry matter of decorticated seed. For physical characters and moisture content each value is a mean of nine replications. But for crude proteins and true proteins each value is mean three determinations. Values with same superscript in a horizontal row do not differ significantly ($P > 0.05$).

entity three replications were run for each sample. Statistical data analysis for testing significance of variation at 5% level was done adopting ANNOVA and Duncan Multiple Test Range (Stephen and Ruth, 2000).

RESULTS AND DISCUSSION

The pods differ significantly in length in majority of the cases (Table 1) and similarly their breadths vary. There also observed significant variation for the number of seeds per pod in most of the cases. Statistical comparison of physical characters of mature seeds for the criteria such as length, breadth, thickness and dry matter weight / seed also revealed about significant variation among the data of majority of the samples for a criterion.

Table 1 also displays that the values of crude proteins of the dry matters of decorticated seed samples are mostly discriminated. The recorded crude proteins values of dry matters of decorticated seeds samples were 16.11 - 28.25%. Herein, it could be inferred that ground seeds of 24 cowpea cultivars contained crude proteins in the range of 23 - 31% (Kochhar *et al.*, 1988). The protein contents of faba bean ranged from 20% to 41% depending upon variety (Vidal - Valverde *et al.*, 1998). Moreover, the protein contents of four varieties of ground bean were 19.91 - 22.36% (Chikwendu, 2007). Whereas, Kempohalli (2013) reported variation of 15 - 26% for crude protein contents of germplasm of Macuna. It could be inferred that inter sample difference of seed protein of *P. timoriana* is not a lesser case. Thus it was conspicuous that mature seeds of *P. timoriana* differed both in protein content and physical characters. Different varieties of soybean also exhibited similar variation of characters (Saxena *et al.*, 1994)

Regarding mature seeds of *P. timoriana* growing in Manipur, reported values of crude proteins were 15.20% (Giri and Singh, 1997), 28.20% (kernel only, Longvah and Deosthale, 1998), 19.63% (Giri, 2000), 21.71%. (Priya and Giri, 2012) when their moisture contents were 7.50%, 10.00 %, 15.05% and 9.95% respectively. Crude protein contents of the mature seeds of *P. timoriana* reported by these authors if converted into dry matter values by calculation, the values would be respectively 16.43%, 31.33%, 23.10% and 24.10%. There are values of crude proteins of the present seed samples (Table

1) closer to above ones. Hence the seed samples analyzed by these authors might be of different physical characters.

The contents of non protein nitrogen of the seed samples were low (0.12 - 0.23%) while their contents of true proteins were noted to be 14.77 - 27.25%. Thus there observed appreciable variation of true proteins contents of some of the samples. For above mentioned 24 cowpea cultivars (Kochhar *et al.*, 1988), true protein contents were recorded to be variable in the range of 20.7 - 27.3% which is closer to their crude protein range. Moreover, crude proteins and true proteins contents of *Cannavina ensiformis* were also noted to be 30.62% and 28.15% respectively (Rajaram and Janardhanan, 1992).

In the present study jumbling exelling of characters among the samples was observed. Thus no case of inter sample similarity in all characters was recorded and moreover none of the samples exelled the others by all characters.

Meitei and Singh (1990) mentioned about availability of nine varieties of *P. timoriana* in Manipur based on organoleptic property. It could be also asserted that *P. timoriana* plant growing in Manipur exhibited genetic variation (Robert *et al.*, 2003). Thus the observed variation of physico - chemical characters of *P. timoriana* might be due to variety/genotype. However Jugindra (1996) proposed that the reason for apparent difference of physical characters of entire pods of *P. timoriana* and their palatability dissimilarity was difference of topographical factors of growing places. The growing sites of *P. timoriana* in different districts of Manipur are plain and hilly terrains of different altitudes, temperature and soil etc. There are more than fifteen villages in Manipur valley producing substantial amounts of *P. timoriana* fruits. Nevertheless, the contents of proteins such as IIS globulin and glycerin of soyabean could be varied depending upon site of cultivation (Gavrilyuk *et al.*, 1987). From the above overall narration it could be concluded that the observed dissimilarity of physico - chemical characters of *P. timoriana* could be due to difference of topographical factors of growing places or variety/genotype or both.

Longvah and Deosthale (1998) reported that quality of proteins of mature seed of *P. timoriana* is not limited by any of essential and semi essential amino acids and this is an unique feature of this tree bean among legumes. The topographical or genetic or genetic+ topographical basis for prevailing of different

physio-chemical characters of *P. timoriana* is to be proven. The potential of this legume toward nutrition, economic upliftment and afforestation should be tried to be fully utilized.

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